

PHYSICAL AND CHEMICAL QUALITY CHARACTERISTICS OF NEWLY RELEASED RICE VARIETIES OF CENTRAL TELANGANA ZONE

T. KAMALAJA¹, K. UMAMAHESWARI², K. UMADEVI³,
S. VANISREE⁴ & A. MARYSWARNALATHA⁵

¹Research Scholar, Department of Foods and Nutrition, PG&RC, PJTSAU, R-Nagar, Hyderabad, India

²Professor and University Head, Department of Foods and Nutrition, PG&RC, PJTSAU, R-Nagar, Hyderabad, India

³Professor, Department of Foods and Nutrition, College of Home Science, PJTSAU, Hyderabad, India

⁴Professor, Department of Genetics & Plant Breeding, Institute of Bio Technology, PJTSAU, R-Nagar, Hyderabad, India

⁵Professor, Department of Home Science Extension and Communication Management,
College of Home Science, PJTSAU, Hyderabad, India

ABSTRACT

Rice is the most important food crop of India covering about one –fourth of the total cropped area and providing food to about half of the Indian population. It contributes about 60–70% of total calories and one-third of daily protein requirement. Nutritional value of rice is mainly determined by the milled rice protein content. Therefore, the present study was conducted to assess physical, chemical and nutritional quality characteristics of two selected newly released rice varieties i.e. Sheet al (WGL283) and Siddi(WGL44) of CTZ and compared with BPT5204. Significant difference for all physical parameters like grain hardness ($p<0.05$), 1000kernel weight, kernel length, breadth and L/B ratio($p<0.01$) was observed between experimental samples (WGL283 and WGL44) and control i.e. BPT5204. Chemical, nutritional parameters also showed significant difference ($p<0.01$) between siddi and sheet al variety as well with BPT5204 except for riboflavin and TSS.

KEYWORDS: Rice, Sheetal (WGL283), Siddi(WGL44), Central Telangana Zone, Physical, Chemical & Nutritional Properties

Received: Jun 02, 2017; **Accepted:** Jun 22, 2017; **Published:** Jul 19, 2017; **Paper Id.:** IJASRAUG201738

INTRODUCTION

Rice is the most important food crop of India covering about one –fourth of the total cropped area and providing food to about half of the Indian population. Recognizing the importance of this crop, the United Nations General Assembly declared 2004 as the International year of Rice. The theme reflects - Rice is life and is important primary food source. It occupies an important position in food security, poverty alleviation and improved livelihood. Rice (*Oryza sativa* L.) is the most important cereal crop of India. It occupies about 23.3 per cent of gross cropped area in the country and is an important staple food for about 65 per cent of the Indian population (Anon., 2006). Rice contributes 43 per cent of total food grain production and 46 per cent of total cereal production of the country. Among the rice growing countries of the world, India has the largest rice acreage and ranks second in production (Anon., 2006). Since rice production is the major occupation of most farmers in Telangana State, to ensure that locally processed rice varieties remain vital and contribute to production of staple food and to rural economy there is a need to evaluate their quality so as to compare them with popular rice

varieties.

Rice quality depends on combination of physical and chemical quality characteristics. The physical characteristics include size and shape of the grain, color, chalkiness, weight, foreign material and moisture content of the grain. The chemical characteristics are about how the grain looks after cooking and how it feels when it is eaten such as gelatinization temperature, amylose content, gel consistency and aroma. Hence, a study was carried out to assess the physical, chemical and nutritional properties of two selected newly released rice varieties (WGL283 and WGL44) of CTZ.

MATERIALS AND METHODS

The two selected newly released rice varieties were procured from the Krishi Vigyan Kendra, Wyra, Khammam Dist. for assessment of various quality characteristics. The paddy samples collected were stored in jute bags and kept at room temperature till further analysis.

The Physical properties viz. grain hardness was assessed by Hardness tester. Bulk density, 1000 kernel weight, Kernel length, breadth and L/B ratio of the sample were assessed by standard procedures for rice given by Sahay and Singh (2005). Length and width of 10 unbroken grains of each were measured with a grain micrometer

The moisture, ash, content was analysed by standard procedure of AOAC(2005). The vitamin and mineral composition was analysed by standard method given by AACC,(2005). The amylose content of samples was analysed by standard procedure of Juliano (1971). Total Soluble Solids (TSS) was assessed by standard procedure given by Ranganna, (1986). The data was analyzed using t -test and analysis of variance (ANOVA) according to Snedecor and Cochran (1969) to detect any difference in mean values from triplicate runs of each treatment.

RESULTS AND DISCUSSIONS

The physical quality characteristics of rice were represented in table 1 and figure 1 & 2.

The grain hardness was 4.1kgs for Siddi(WGL44) variety and 6.4kgs for Sheetal(WGL283) variety. Statistically significant difference ($P < 0.05$) was found in grain hardness between siddi and sheetal. Significant difference ($p < 0.05$) was found for the grain hardness of NRRVs compared with check variety BPT5204.

The bulk density of Siddi variety was 0.85g/ml whereas it was 0.89 g/ml for Sheetal variety. A significant difference ($p < 0.01$) was found in the mean bulk density values between siddi and sheetal varieties and also compared with check variety i.e BPT5204.

The 1000 Kernel weight of Siddi variety was 8.5g and Sheetal variety was 14.5g. Statistically no significant difference was found in 1000 kernal weight between siddi and sheetal varieties. Whereas the NRRVS compared with check variety BPT 5204 had significant difference ($p < 0.01$).

Table 1: Physical Quality Characteristics of Selected Newly Released Rice Varieties in Comparison with BPT5204

Rice Varieties	Grain Hardness (Kg)	Bulk Density (g/ml)	1000 Kernel Weight (g)	Kernel Length (mm)	Kernel Breadth (mm)	L/B Ratio (mm)	Grain Type
NRRVs							
Siddi (WGL44)	4.10±1.26	0.85±0.01	8.51±0.22	4.37±0.13	1.45±0.04	3.00±0.12	Medium short
Sheetal	6.40±2.57	0.89±0.01	14.59±0.16	5.80±0.34	1.72±0.06	3.38±0.18	Slender

(WGL283)							Medium
t-value	2.17*	7.48**	1.00 ^{NS}	11.5**	9.90**	4.64**	
Check Variety							
BPT5204	5.60 ±1.07	0.92±0.07	10.57±0.07	5.10±0.10	1.41±0.04	3.61±0.11	Medium short
f-value	3.241*	5.078**	54.948**	75.349**	87.89**	33.83**	

Values are expressed as mean \pm SD; *Significant at ($p < 0.05$); **Significant at ($p < 0.01$); NS- No significant. Statistically significant difference was found ($p < 0.01$) between siddi and sheetal varieties, when the mean kernel length was compared, the difference in mean kernel breadth was also found to be significant ($p < 0.01$). The difference in ratio between length and breadth was found to be significant at ($p < 0.05$). Whereas NRRVS when compared with check variety BPT5204 the mean kernel length, breadth and length and breadth ratio were also found to be significant at ($p < 0.01$).

The chemical and nutritional quality characteristics of NRRVs are given in table 2.

The moisture content of newly released rice varieties was compared with check variety and found the average moisture content in check variety BPT5204 was 8.1%, Siddi variety was 12.1% and Sheetal variety was 13.2%. Statistically a significant difference ($p < 0.01$) in moisture content was found between check variety and NRRVS and also between siddi and sheetal varieties. The average ash per cent was compared, between check variety BPT5204 (0.71%), Siddi (0.83%) and Sheetal (13.2%). Statistically significant difference ($p < 0.01$) was found between the check variety and NRRVs and also between siddi and sheetal varieties.

The average protein content was compared, between check variety BPT5204 and NRRVs. The highest protein content was found in siddi variety (10.6%) and lowest in check variety BPT5204 (8.46%). A significant ($p < 0.01$) differences was found in mean protein content between these NRRVs and check variety as well as within two NRRVs i.e. siddi and sheetal. The mean fat percent in check variety BPT5204 was 0.4%, Siddi 0.9% and Sheetal 0.69%. Significant difference in fat percent was found ($p < 0.01$) between check variety and NRRVS, as well as within two NRRVs i.e. siddi and sheetal. The average difference in fiber percentage was significant at ($p < 0.01$) between check variety BPT5204, and NRRVs (siddi and sheetal), as well as between Siddi and Sheetal varieties. The highest CHO content was found in check variety BPT5204 (83.2%) and lowest in Sheetal variety (76.9%). A significant ($p < 0.01$) difference was found in mean protein content between check variety and NRRVs and also within two NRRVs i.e. siddi and sheetal.

The mean thiamine content in check variety BPT5204 was 0.06mg/100g, and newly released rice varieties Siddi was 0.05mg/100g and Sheetal was 0.05mg/100g and there was no significant difference between the check variety and NRRVS, as well as between the two NRRVs i.e. siddi and sheetal. No significant difference in riboflavin content was found between check variety and NRRVs; all had almost equal quantities of riboflavin. The average amount of niacin found in check variety BPT5204 was 1.9mg/100g, in Siddi variety 1.5mg/100g and in Sheetal variety 1.25mg/100gm. statistically significant difference ($p < 0.01$) was found in niacin content between check variety and NRRVs, as well as within NRRVs i.e. siddi and sheetal. On an average iron content of check variety BPT5204 was 8.6mg/kg, Siddi variety 19mg/kg and Sheetal variety 16mg/kg, and significant difference ($p < 0.01$) between Check variety and NRRVs and also between NRRVs i.e. siddi and sheetal was observed. Significant difference was found ($p < 0.01$) for zinc content in the check variety BPT5204 and NRRVs and also between Seetal and Siddi.

The amylose content in check variety BPT5204 was 22.5g and it was 22.4g and 23.6g Siddi and Sheetal varieties respectively. Statistically significant difference ($p < 0.01$) between the check variety and newly released rice varieties (siddi

and sheetal) was observed.

The difference in TSS was not significant between the check variety and NRRVs, whereas between Siddi (3.26° brix) and Sheetal (3.4° brix) varieties, a significant difference ($p < 0.01$) was found.

Table 2: Chemical and Nutritional Properties of Newly Released Rice Varieties in Comparison with BPT5204

Rice Varieties	Moisture (%)	Ash (%)	Protein (%)	Fat (%)	Fiber (%)	CHO (%)	Thiamine (mg/100g)	Riboflavin (mg/100g)	Niacin (mg/100g)	Iron (mg/kg)	Zinc (mg/kg)	Amylose (g)	Tss Brix
SIDDI	12.11 ± 0.32	0.83 ± 0.01	10.63 ± 0.02	0.94 ± 0.03	0.17 ± 0.01	75.32 ± 0.02	0.056 ± 0.04	0.08 ± 0.03	1.51 ± 0.01	19.0 ± 0.01	8.30 ± 0.001	22.4 ± 0.02	3.20 ± 0.11
Sheetal	13.2 ± 0.38	0.54 ± 0.02	8.50 ± 0.04	0.69 ± 0.01	0.13 ± 0.04	76.94 ± 0.01	0.054 ± 0.02	0.07 ± 0.01	1.25 ± 0.02	16.0 ± 0.04	13.76 ± 0.01	23.6 ± 0.02	3.40 ± 0.15
Tvalue	5.80**	34.30**	26.12**	20.91*	2.57*	91.60**	0.11 ^{NS}	0.83 ^{NS}	30.70**	92.50**	14.20**	12.20**	2.80*
BPT 5204	8.10 ± 0.64	0.71 ± 0.19	8.46 ± 0.06	0.43 ± 0.15	0.30 ± 0.05	83.20 ± 0.04	0.06 ± 0.01	0.06 ± 0.01	1.9 ± 0.001	8.6 ± 0.02	13 ± 0.092	22.5 ± 0.001	3.20 ± 0.25
Fvalue	230.76**	12.18**	348.00**	58.11**	39.50**	173.30**	0.09 ^{NS}	1.909 ^{NS}	486.42**	286.33**	396.92**	451.68**	3.381 ^{NS}

Values are expressed as mean ± SD; *Significant at ($p < 0.05$); **Significant at ($p < 0.01$); NS- No significant

CONCLUSIONS

It can be concluded that Sheetal rice variety had significantly higher physical qualities (grain hardness, bulk density, kernel weight, length and breadth) compared to Siddi and BPT5204. The moisture content of sheetal rice variety was significantly higher than siddi and BPT5204. The nutritional properties of siddi rice variety were significantly higher compared to sheetal. From the point of farmers, the Sheetal rice variety can be preferred for fetching higher income. However, from the nutritional point of siddi can be preferred. Both the NRRVs are on par with popular rice i.e. BPT5204 in terms of physical, chemical and nutritional quality characteristics and can replace BPT5204 to create demand for the new varieties.

REFERENCES

1. AACC. 2005. *American Association of Cereal Chemists: Approved Methods*. St. Paul, Minnesota.
2. Anon. (2006). *Perennial Species. Fact sheet No 1. Central West/ Lachlan Grain & Graze*. ISBN 0 7347 1670
3. AOAC. 2005. *Official Methods of Analysis of the AOAC International, 16th 432 ed., supplement 1998*. AOAC, Washington, DC, USA. 25–28..
4. Juliano B. O. 1971. A simplified assay for milled rice amylose. *Cereal Science Today*, 16(10): 334–360.
5. Ranganna, S. 1986. *Hand book of Analysis and Quality control for fruit and vegetable products*. Tata McGraw Hill., New Delhi. 7-12.
6. Sahay K.M. and Singh K.K. 2005. *Unit operations of agricultural processing. Second revised and enlarged edition*, vikas publishing house pvt ltd, second reprint. 273.
7. Snedecor G.W and Cochran W.G. 1983. *Statistical Methods*. Oxford and IBH publishing company. New Delhi.